

THE ENTOMOLOGY OF THE GRASS-TREES
(*XANTHORRHOEA*).

BY WALTER W. FROGGATT.

(Plate IX.)

Four species of *Xanthorrhoea* are recorded from the County of Cumberland, within the limits of which all my entomological specimens have been collected; as their general structure is similar, it is not surprising that the same species of insects are to be found frequenting all four alike.

At first sight a grass-tree might not appear to be a profitable field for investigation by the entomologist; yet whether alive or dead it is the home of a considerable number of interesting insects, some of which are born and die in it, while others are only passing visitors. A grass-tree presents three distinct parts, each with its special frequenters; first the stout cylindrical stem or trunk, generally two or three feet high, and consisting of a tubular sheath composed of the basal portion of the fallen leaves matted together into a solid ring, and thickly impregnated with the yellow resinous gum, and in which nothing lives; this encloses the caudex, composed of close fibrous matter, which in a living tree contains nothing, but after death it decays very rapidly, and soon becomes the abode of much insect life, for which the outer covering or sheath forms a protection. Secondly, there is the coarse grass-like foliage which is the resort of many small beetles, spiders, &c., which lurk about the bases of the stalks; it is also eaten by several beetles and is visited by others. Thirdly, the flower-stalk and scape which both alive and dead furnishes food or a home to certain beetles, bees, and ants.

As the grass-trees generally thrive best in poor sandy country covered with low scrub, great numbers are scorched up by the bush fires every season. It is in such burnt patches that most of the grass-trees examined by me occurred.

COLEOPTERA.

MICROPECILA BREWERI, JAINSON.

Larva about $1\frac{1}{2}$ inches in length; white, rather elongate and cylindrical; head reddish-brown, rugose, rounded behind, slightly impressed in the centre with a wavy line running across on either side to the base of the antennæ; stout black jaws armed with three small blunt teeth; a broad elongate brown patch on either side of the first thoracic segment, above the first spiracle; legs long, covered with long ferruginous hairs; thoracic segments and first seven abdominal segments furrowed into three ridges covered with short dark spiny bristles, together with a transverse row of longer hairs across the tip; 8th segment smooth and shining, covered with scattered short spines, and tinged with blue from the internal food, the anal segment rounded at the tip.

Beetle $10\frac{1}{2}$ lines in length, all the underside, legs, head, the centre of the thorax and elytra smooth, shining black, with a broad marginal band encircling the thorax and elytra deep orange yellow; sides of the wing-covers showing shallow punctured parallel striæ.

Near Hornsby I obtained a large number of larvæ early in July from a patch of dead grass-trees in which they were living in the rich black vegetable mould into which the inner portion of the caudex had been transformed by the action of the weather and their jaws. Towards the beginning of May they began to form earthy oval cocoons on the bottom of the tin, where they remained until the end of November, when the beetles began to come out.

The beetles are found with many others feeding upon the flowers of the dwarf *Angophora*.

CISSEIS 12-MACULATA, Fab.

I have never found the larva of this pretty little buprestid, and do not know anything about its life-history, but the beetle is common about Sydney in early summer, feeding upon the

leaves, clasping the foliage with its legs, but dropping to the ground at the least alarm.

Beetle 5 lines in length, with the head bright metallic green. thorax and elytra of a much darker tint, the whole deeply and closely punctured; sides of the thorax ornamented with a pale buff patch on either side, with four transverse rows of the same coloured oval spots, the first and last containing two and the middle ones four each; undersurface of a bright metallic green, with a patch of buff below the hind legs, and at the margin of each abdominal segment.

TRIGONOTARSUS RUGOSUS, Boisd.

(Plate IX., figs. 1-3.)

Larva with smooth castaneous head; thoracic segments pale reddish-brown and not more than half as thick as the centre of the pale yellow abdominal ones, which are generally arched up behind the head; length in repose about an inch, but when moving about it extends its body half as far again; thoracic segments rather flattened upon the dorsal surface, with the abdominal ones of a uniform length and very much wrinkled; anal one terminating with two short truncate tubercles of a reddish-brown colour, with several smaller ones round them.

The larvæ bore holes into the fibrous caudex near the bottom of the trunk of the grass-tree, where they must feed for some time, as I have taken the larvæ, pupæ, and beetles in the same tree about the middle of the year.

Pupa 14 lines in length, white to dull yellow in colour; snout very thick, and curved straight down over the breast, both it and the rest of the head lightly clothed with stout bristles, which also extend over the sides of the thorax; wing-cases drawn round the shoulders, short, and rounded at the tips, and deeply and regularly striated; thoracic segments bearing a transverse ridge of coarse irregular spines across the centre of each segment except the anal one, which is ornamented with a crescent-shaped mark turning downwards, clothed with a few scattered hairs.

Beetle is 16 lines in length, stout and rather flattened on the back, of a uniform black colour, with the broad head and thorax finely rugose, the elytra being deeply ridged with regular punctured striae. The curious form of the tips of the tibiae which terminate in a long slender spine projecting beyond the tarsi enables it if touched to cling very tightly to anything when laid upon its back.

ACANTHOLOPHUS MARSHAMI, Kirby.

This is the common Amycterid about the neighbourhood of Sydney. Most of the members of this large genus live upon the grass, but this one climbs up the leaves of the grass-tree, and clinging round them gnaws pieces out.

Beetle slightly under an inch in length; of a sooty-brown colour; the head stout, an angular spine on either side between the antennae, a stout double pointed knob in front of each eye, and the antennae and mouth parts hairy; thorax rather oval, flattened on the summit but very rugose, with three stout conical spines along the outer margins, and two irregular lines of shorter ones divided by the stout median suture; legs stout, with tibiae and tarsi hairy; elytra broad, flattened on the summit, the sides transversely corrugated, the upper margins ornamented with an irregular line of large conical spines and numerous smaller ones covering the whole of the back; abdominal plates beneath covered with fine silvery scales or hairs.

TRANES sp.

Beetle 6 lines in length, all black; head small; snout long and stout; antennae thick at the tip; thorax rounded in front, the sides flattened on the summit and thickly covered with fine circular punctures; legs short and strong; dark ferruginous, with the tarsi lighter coloured; elytra much broader than thorax, which is arched slightly in front, flattened on the back, and thickly ribbed with parallel deeply punctuate striae.

This beetle is not very common; it occurs towards the base of the flower stalk and the young leaves. My specimens were obtained from trees at the Hawkesbury.

SYMPHYLETES SOLANDRI, Fabr.

The life-history of this fine longicorn is given by me in detail in the Proceedings of this Society (Vol. ix. (2), p. 115, 1894). Though not generally a very common beetle unless in an exceptional season, it is one that is very easily bred from infested flowerstalks if kept in a box.

XANTHOLINUS ERYTHROPTERUS, Erichs.

(Plate IX., figs. 4-5.)

Larva slender, flattened, $7\frac{1}{2}$ lines in length, with the head, prothorax, and legs ferruginous, the rest of the thoracic and all the abdominal segments pale yellow, lightly fringed with hairs; head longer than broad, rounded behind, and armed with long slender black jaws; antennæ 4-jointed, 2nd and 3rd joints long, slender, and swollen at the apex, 4th shorter and rounded at the tip; prothorax rounded in front, truncate behind, both head and thorax with a slight median suture; legs short and thick, with slender tarsal claws; abdominal segments uniform with meta-thorax, the anal one tapering to the tip and armed with a slender hairy appendage on either side.

Pupa is a tightly swathed ferruginous bundle, the thoracic portion forming a roof-like covering over the turned down head, the legs in front, the hind pair forming a rounded projection in front of the upper abdominal segments, which are round and cylindrical to the tip.

Beetle six lines in length, all smooth, shining, black, except the wing covers, which are bright reddish-brown; head rounded, much broader than the thorax, deeply impressed above the long sickle-shaped jaws, and lightly fringed in front with reddish hairs; antennæ with brownish pubescence, the terminal joint of palpi ferruginous; thorax broadest in front, sloping on either side, and rounded at apex, lightly fringed with blackish hairs; legs short and spined, thickly covered with blackish hairs; elytra finely punctuate, broadest at apex, truncate; abdomen rather

short, thickly fringed and lightly covered upon both sides with long blackish hairs; first four segments of uniform size, fifth nearly twice as wide and tapering to the small anal segment.

The larvæ are plentiful in spring between the sheath and the caudex, preying upon the many minute creatures attracted by the decaying matter. Like others of the *Staphylinidæ*, the beetles are very active, and are found in the same stumps with the larvæ; the pupa bred out in the Museum under glass in some damp earth.

HOLELEPETA SI NENSIS, Marsham

This is one of the commonest beetles found in the top of the decaying caudex, or between it and the outer sheath. Though I have examined great numbers of the stems at all seasons of the year, I have never come across the larval or pupal forms.

Beetle half an inch in length, smooth, shining black, broad and flat; the head armed in front with two curved stout pointed horns projecting in front of the eyes and touching at the tips, hollowed out in front at base of horns, with an excavation behind the eyes, and a small blunt spine on the side; thorax with a faint impressed line in the centre, and along the outer edges slightly pitted with small punctures; elytra without any punctures, but a slender purse-like cavity on either margin caused by the edge of the elytra turning upwards; chitinous plates covering the apex of the abdomen impressed with larger rounded punctures on their edges; underside except the central plate between the legs also finely punctured.

I have never collected this species any where else, though others in the north are often found crawling on tree trunks.

PLATYSOMA sp. ?

This beetle evidently passes through all its transformations in the decaying caudex, but after examining a great number of plants in all stages of decay, and at all seasons of the year, I have never been able to identify the larva, though once or twice I have found the pupa just ready to turn into the perfect insect,



from which it only differs in colour, being dull white. The beetles are often very numerous, twenty or thirty being obtained from one stump.

Beetle $1\frac{1}{2}$ lines in length, broad and oval, black and shining; head small, round in front; thorax smooth, truncate behind; elytra smooth in the centre, with four very distinct striæ on each side, and truncate at the apex; the tip of the abdomen sloping downwards.

ALLECULA SUBSULCATA (?), Macl.

Larva is a typical heteromorous wire worm; slender, cylindrical, smooth, and shining, about an inch in length, of a uniform ochreous colour; head and tip of the abdomen ferruginous, and an apical narrow band round the abdominal segments dark brown; head small, rounded in front, with slender sickle-shaped jaws, short antennæ, and long drooping palpi; legs are comparatively long, with slender tarsal claws.

They are very active little creatures, living in the rich black mould left by the decaying caudex; sometimes they are very numerous; common in July and August.

Pupa pale yellow, short and angular, with the head drawn down over the thorax, antennæ curling round under the fore legs, and coming over the hind ones, labial palpi projecting over the fore legs and showing the peculiar axe-shaped terminal joint; outer edges of the abdominal segments flanged and finely serrate, the anal one terminating in two fine spines, wing cases short and wrinkled.

Beetle 7 lines in length, all black, except the last three joints of antennæ and last two joints of the tarsi, which are pale ferruginous; head and thorax closely and finely punctured; antennæ 11-jointed, long, slender, and cylindrical, 2nd joint very short, 3rd longest, apical joint of the labial palpi large and axe-shaped; legs long, apex of tibiæ and the tarsi clothed with fine reddish hairs; elytra rugose and deeply grooved with parallel striæ, thickly and deeply punctured; all the ventral surface closely punctured.

The beetles began to emerge from the earth, in which the larvæ had buried themselves, about the middle of November.

They are often found in the summer time hiding among the dead leaves among the bushes or clinging to the twigs.

HYMENOPTERA.

LESTIS BOMBILIFORMIS, Smith.

This beautiful carpenter bee forms its nest in the flower stalks of the grass-trees found about Sydney, after they have borne the flower and have become dry and hard. It begins by boring a circular hole, $3\frac{1}{2}$ lines in diameter, about three or four feet up the stalk, in towards the centre, when it turns downwards, excavating nearly all the pith out for a distance of about four inches down, then working upwards, so that the tunnel is about eight inches from end to end, with an average of half an inch in diameter. The cells are made about half an inch in length, with a ball of bee-bread and an egg deposited in the far end, each being partitioned off from the other by a stout pad or wad of triturated pith. I have never found the whole length of the chamber filled with bee larvæ, a space being usually left unoccupied in the centre.

Larva a dull white-coloured grub of cylindrical shape, attenuated towards both extremities, about half an inch in length when full grown. They can be found in all stages about November.

♂. Bee $7\frac{1}{2}$ lines in length, bright metallic green, with the face yellow, eyes brown; antennæ, ocelli, and mouth parts black, sides of the face, back of head, thorax and legs thickly covered with short golden yellow hairs, with three dark parallel bars of blackish hairs crossing the centre and on either side; above the wings clouded with brown, covered with fine brown spots over the marginal cells, and having fine metallic purple iridescence; upper surface of the abdominal segments finely rugose, without hairs; under surface covered with dark brown hairs, the tip with black.

♀. Bee 9 lines in length, of a brilliant metallic blue colour, with the abdominal segments showing coppery tints, face and

head behind the eyes covered with greyish white hairs, thorax, legs, and under surface of abdomen thickly clothed with black hairs except the sides of the anal segments, which are fringed with white hairs; wings darker than in the male.

Mr. F. Smith gave a short account* of the habits of this bee, communicated to him by Mr. Ker, who stated that it inhabited the hollow stem of a *Zamia* or grass tree, the entrance to the tube being rounded like the mouth of a flute.

DOLICHODERUS DORIÆ, Emery.

These ants are very common about Hornsby, and are very fond of the sweet sugary lerp formed upon the leaves of the Eucalypts by the larvæ of several species of *Psylla*, so that where the lerp is plentiful the leaves are often covered with them, all intent upon the enjoyment of their sweet food. They form their nest between the caudex and dry outer sheath of the dead and dry grass trees, often in such numbers that the cavity between the caudex and the outer mass is a living mass of ants.

Ant ♀, 4 lines in length, head and thorax black, very rugose, the latter armed with a pair of stout spines projecting in front of the prothorax, with a similar pair at the base of the metathorax, longer and pointing downwards; antennæ and legs ferruginous, the node short but stout; abdomen black, covered with a brownish pubescence, heart-shaped, hollowed out in front down the centre, with the outer margins rounded and forming regular rounded tips.

IRIDOMYRMEX GRACILIS, Lowne.

A small slender black ant that makes its nest in the dead flower stalks of the trees, hollowing out the interior in irregular parallel passages, a large nest of them often occupying the whole stalk.

♀. Ants are under 3 lines in length, pitchy brown, with very long slender legs covered with a very fine grey pubescence; head

* Notes on the Habits of Australian Hymenoptera, Trans. Ent. Soc. London, Vol. i. (2nd Ser.) p. 179, 1850.

large, smooth, and shining, truncate at the base, and rounded towards the jaws; thorax narrow, smooth and shining; abdomen short, rounded and pointed towards the tip.

DIPTERA.

ORTHOPROSOPA NIGRA, Macq.

(Plate IX., figs. 6-8.)

Larva 8 lines in length, dirty white to brownish, rounded at the head, widest about the centre, tapering towards the tip of abdomen which is produced into a stout horny ochreous appendage truncate at the tip and armed at the base with a short fleshy spine on either side.

The maggots, frequently in great numbers, are found living in the slime and putrid water which accumulates between the outer shell and the caudex of the dead stem, about midwinter; numbers kept under observation remained about six weeks before changing into pupæ. The latter were simply the skin of the maggot hardened into a brown oval case covered with particles of earth attached to it, and the anal appendage shortened and retracted.

This handsome fly (one of the *Syrphidae*) is 7 lines in length, shining black, with the antennæ and face bright yellow; thorax covered with a very short fine blackish down and ornamented with a pair of rounded naked black spots in the centre; wings slightly fuscous, legs black; abdomen stoutest at the base, rounded towards the tip.

ORTHOPROSOPA sp.

(Plate IX., figs. 9-11.)

Larva dirty white, 10 lines in length, but able to retract or extend its segments considerably; head rather truncate in front, with the sides round, narrow, with segments of uniform size, tapering towards the tip which is produced into a slender fleshy tail; two-thirds of the length of the whole of the body terminating in a slender horny tube or spine, truncate at the tip.

The larvæ live in the decaying wood and putrid water that has accumulated between the caudex and the sheath, crawling about mixed up with the maggots of the last described species, sometimes in considerable numbers. Specimens kept in a damp jar pupated among the rotten wood at the bottom about three weeks after they were taken. Pupa case light brown, covered with bits of dirt; the apex and sides rounded, oval, with the long slender anal segment produced into a slender tube curving sharply round, and retaining the anal tube at the tip.

Fly 5 lines in length, steely blue, thorax and abdomen smooth and shining; face and antennæ covered with fine hairs, the latter short with the last segment oval and flattened, ornamented with a fine bristle; legs piceous, covered with fine hairs; wings hyaline, very slightly clouded.

EPHIPPIUM ALBITARSIS (?), Bigot.

(Plate IX., figs. 12-13.)

Larva 8 lines in length, 2 in width, varying from greyish-brown to black; head much narrower, slender, horny, broadest at the base, sloping up to a truncate tip, with an eye-like spot on either side, and several short bristles along the sides, the mouth concave; thoracic and abdominal segments broad, convex on both dorsal and ventral surfaces, the hind margin of the first five sloping back, first arcuate behind the head, narrow, the following ones gradually increasing in size to the fourth, and of a uniform width to the ninth, tenth smaller, the last spatulate, with a round impression on the dorsal surface; outer margins of each segment fringed with two long bristles, a few scattered ones over the dorsal surface.

The pupa undergoes its transformation in the larval skin, the fly emerging from the base of the head. They are plentiful in decaying stems between the caudex and sheath, living among the rotten matter, and are very sluggish in their habits. Specimens I collected remained among some rotten wood and mould for

about three months before the flies began to emerge about the end of September.

Fly varying from $4\frac{1}{2}$ to 3 lines in length, all black except the white tarsi; head broad, rugose between the eyes; antennæ spindle-shaped, pointed towards the tips, standing straight out, without any terminal bristle; thorax rounded in front, broadest about the middle, finely granulated on the dorsal surface; scutellum almost square, the apical edge having a short spine on either side; legs stout; wings dusky, nervures black, the wings creased in the centre and folded down over the tip of the abdomen; the latter constricted at the base, large and round, finely granulated, with the apical segments turning downwards, and the extreme tip truncate.

This is a typical form of the family *Stratiomyidae*, and is, I believe, identical with Bigot's *C. albitarsis*, one of the few described Australian species.

Another very pretty little fly also lives in the rotten caudex, the larvæ of which I have never observed, but have bred several from the pupæ, which are oval brown cases covered with particles of earth, the front broadest, with a cylindrical short truncate spine on either side, standing out like a little horn, the apical tip rather pointed.

The fly, which belongs to the family *Trypetinæ*, is often found upon the leaves, moving its wings up and down (as many members of this family do when resting), but is very hard to catch; common in November.

Fly 3 lines in length; head black, narrow; last joint of the antennæ large and circular, terminated with a stout bristle; head and thorax hairy, the latter steely blue; scutellum large, yellow, with black markings on the apical edge which is truncate and fringed with hairs; legs long, pale yellow; wings hyaline, thickly mottled with irregular black blotches over the apical half; abdomen broad, heart-shaped, pale ochreous yellow, rounded on dorsal surface, with a curious imprinted brown mark in centre; thin and flat on the underside, tinged with black towards the tip, and tufted with silvery white hairs on the sides.

LEPIDOPTERA.

APHOMIA LATRO, Zeller.

Larva half an inch in length, dark brown to black upon the dorsal surface, with lighter parallel stripes down the centre of back, and along each side; head large, smooth, shining, and divided in the centre by a suture; prothorax rounded and large; other thoracic segments uniform with the abdominal ones; legs moderately stout, with small pointed tarsal claws; ventral surface pale yellow.

The larvæ live in small communities, feeding upon the scape of the flower stalk, gnawing up all the undeveloped buds, which become matted together with their loose web. They move about very rapidly, and pupate on the flower head, forming elongate white silken cocoons.

Pupa long and slender, reddish-brown, with the wing-cases curving round in front and covering the first five segments; a raised ridge running down the centre of back; anal segment armed with a number of short conical spines.

Moth $1\frac{1}{2}$ inches across the wings, which are long and slender, and rounded at the tips; creamy buff colour shot with fine black spots, and divided down the centre with a broad parallel stripe of white. Hind wings silvery grey, thickly fringed with long semi-opaque hairs along the tips and lower margin; body slender, apical segments darkest.

Mr. Ernest Anderson, who identified this species for me, says that it is common in Victoria, where it also feeds upon grass-trees and stems of rushes. Bred in the Museum about the end of October, from infested flowers received from the Curator.

HOMOPTERA.

ASPIDIOTUS ROSSI, Mask.

The foliage is often quite discoloured with the number of black scales (adult females) infesting the leaves, often overlapping each other like a lot of oyster shells.

CHIONASPIS EUGENIÆ, Mask.

I found this scale very plentiful upon the leaves of a patch of grass-trees last March at Botany, but it is more generally found upon *Leptospermum*, *Melaleuca*, and *Eugenia*. The adult female coccids are pale yellow at the tip, with the long slender test pearly white, and are attached along the outer edge of the under-surface of the leaves.

EXPLANATION OF PLATES.

Trigonotarsus rugosus, Boisd.

- Fig. 1.—Larva (nat. size).
 Fig. 2.—Larva—front view of head (enlarged).
 Fig. 3.—Pupa (nat. size).

Xantholinus erythropterus, Erichs.

- Fig. 4.—Larva (enlarged). The line beside shows the length.
 Fig. 5.—Pupa (enlarged). The line beside shows the length.

Orthoprosopa nigra, Macq.

- Fig. 6.—Larva (enlarged).
 Fig. 7.—Pupa (enlarged).
 Fig. 8.—Fly (enlarged).

Orthoprosopa sp.

- Fig. 9.—Larva (enlarged).
 Fig. 10.—Pupa (enlarged).
 Fig. 11.—Fly (enlarged).

Ephippium albitarsis (?), Bigot.

- Fig. 12.—Larva (much enlarged).
 Fig. 13.—Fly (enlarged).